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Atty. Dkt. No. 037768-0137

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant: Tapesh YADAV et al.

Title: PRINTING INKS AND REAGENTS FOR NANOELECTRONICS AND CONSUMER PRODUCTS

Appl. No.: 10/679,611

Filing Date: 10/6/2003

Examiner: Jerry A. Lorengo

Art Unit: 1755

Confirmation Number: 3294

REVISED BRIEF ON APPEAL

Mail Stop Appeal Brief - Patents
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Sir:

This communication is responsive to the Notice of Non-Compliant Amendment dated May 20, 2008, concerning the above-referenced patent application.

Specifically, this revised brief expands the previously reply brief, to present a concise explanation of the subject matter defined in each of the independent claims, referring to the specification by page and line number (see pages 6-7).

Further, Appellants note that page 4 details the status of the claims.

Appellants believe no fees are necessary. However, if this is not the case, authorization is hereby given to charge any deficiency (or credit any balance) to the undersigned deposit account 19-0741.

REAL PARTY IN INTEREST

The real party in interest is PPG Industries Ohio, Inc.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

STATUS OF CLAIMS

Claims 17-41 are pending in the application. Claims 1-16 have been cancelled without prejudice or disclaimer and claims 17-41 are rejected and are the subject of this appeal.

STATUS OF AMENDMENTS

There are no amendments that have not been entered.

SUMMARY OF CLAIMED SUBJECT MATTER

Screen printable formulations comprise filler particles for polymeric composites that are on the order of or significantly less than the number of atoms in the polymer molecules of which the polymeric composites comprise. The filler particles are metallic and/or ceramic in the form of nanowhiskers, fibers, and/or plates. The screen printable formulations are in the form of inks and/or pastes. Products and prints are derived from these screen printable formulations.

Independent claim 17 recites a screen printable formulation comprising metallic fillers with a domain size less than 100 nanometers and an aspect ratio greater than one. The specification illuminates claim 17 on pages 9 to 10 (line numbers 18 to 9, respectively), pages 11-12 (line numbers 24-3, respectively) and pages 22 to 24 (line numbers 20 to 15, respectively), which variously discloses a screen printable formulation comprising metallic fillers with a domain size less than 100 nanometers and an aspect ratio greater than one.

Claim 24 recites a screen printable formulation comprising ceramic nanofillers with domain size less than 100 nanometers and an aspect ratio greater than one. Referring to the specification at page 8, lines 18-22, the specification states that "nanostructured filler materials may also have utility in the manufacture of other types of composites, such as ceramic- or metal-matrix composites. Again, the changes in the physical properties of the filler particles due to their increased surface area and constrained domain sizes can yield changes in the achievable properties of composites." The specification further illuminates claim 24 variously at pages 11-12 (line numbers 24-3, respectively) and pages 22 to 24 (line numbers 20 to 15, respectively) / page 31, lines 12-22.

Claim 32 recites a screen printable formulation comprising nanofillers with domain size less than 250 nanometers and the nanofillers comprise copper. The specification illuminates claim 32 on pages 9 to 10 (line numbers 18 to 9, respectively), pages 11-12 (line numbers 24-3, respectively) and pages 22 to 24 (line numbers 20 to 15, respectively), which variously discloses a screen printable formulation comprising nanofillers with domain size less than 250 nanometers and the nanofillers comprise copper.

Claim 33 recites a screen printable formulation comprising nanofillers with domain size less than 100 nanometers and the nanofillers comprise copper. The specification

illuminates claim 33 on pages 9 to 10 (line numbers 18 to 9, respectively), pages 11-12 (line numbers 24-3, respectively) and pages 22 to 24 (line numbers 20 to 15, respectively), which variously disclose a screen printable formulation comprising nanofillers with domain size less than 100 nanometers and the nanofillers comprise copper.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 32, 33, 38 and 40 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,944,985 to Alexander.

Claims 39 and 41 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,944,985 to Alexander.

Claims 17-31 and 34-37 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,944,985 to Alexander in view of U.S. Patent No. 4,292,029 to Craig or U.S. Patent No. 5,718,047 to Nakayama.

ARGUMENTS

I. Claims 32, 33, 38 and 40 are not anticipated under 35 U.S.C. § 102(b) by U.S. Patent No. 4,944,985 to Alexander.

Appellants submit that claims 32, 33, 38 and 40 cannot be anticipated by Alexander.

For a claim to be anticipated, the "identical invention must be shown in as complete detail as is contained in the . . . claim." (*Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).) 35 U.S.C. § 103 amplifies the meaning of this anticipation standard by pointing out that anticipation requires that the claimed subject matter must be "***identically*** disclosed or described" by the prior art reference. (Emphasis added.)

Claims 32 and 38 require nanofillers that have a domain size less than 250 nanometers and that comprise ***copper***. Alexander teaches no such embodiment having the recited size that also comprises copper.

The Office Action asserts that Alexander's disclosure of ultra-fine particles having a size in the range of 5 to 500 nm (column 1, lines 10-12) which may comprise metals such as copper (column 1, lines 16-17; and column 6, lines 21-40), renders the claims anticipated. However, these portions of Alexander disclose ultra-fine particles of an average size less than about 20 microns, *where the ultra-fine particles may be copper*, and when the particles are substantially spherical in shape or colloidal, the diameter of the particles is preferably less than 0.5 microns and, in some instances, the preferred range of size is 5 to 500 nanometers. Thus, Alexander merely teaches, at most, overlapping ranges.

In the event that claims are directed to a narrow range, as is the case here, and the alleged anticipatory reference teaches a broad range, the narrow range is not disclosed with "sufficient specificity" to constitute an anticipation of the claims, without more. (*Atofina v. Great Lakes Chem. Corp*, 441 F.3d 991, 999, 78 USPQ2d 1417, 1423 (Fed. Cir. 2006).) Here, Alexander discloses particles including ***copper*** having a preferred range of 5 to 500 nanometers, but not in a range less than 250 nanometers as claimed. Indeed, this is not a case

of a narrow range in a broad range, but instead a case where ends of ranges merely overlap with one another. Therefore, Alexander does not anticipate claims 32 and 38.

* * * * *

Recognizing the deficiencies with its initial argument regarding anticipation due to the overlap of the ranges, the Office Action then refines its anticipation rejection, stating that Alexander specifies particle sizes less than 200 nanometers at column 13, lines 24-25. ***However, this portion of Alexander is directed solely to powders comprising solely silica, not copper***. For a claim to be anticipated, the prior art must describe the invention exactly as claimed. Thus, this portion of Alexander does not anticipate claims 32 and 38, because it does not disclose copper.

Claims 33 and 40 require nanofillers with a domain size less than 100 nanometers that likewise comprise ***copper***. The Office Action indicates that Alexander discloses particle sizes of less than 100 nm at column 15, line 44. This portion of Alexander refers to metal-metal oxide composite powders. (See column 15, lines 8-12). Alexander further states that these composite powders may be used as master alloys to be added to unmodified metal powders. (See column 15, lines 50-53).

Alexander does propose an application of using the particles to harden and stiffen copper (see column 15, lines 53-61). However, Alexander is silent as to whether the metal-metal oxide composite powders comprise copper, the diameter of unmodified metal powders, and the whether the unmodified metal powders comprise copper.

A reference disclosing a large number of species cannot be said to anticipate one of the species. (*In re Meyer,* 599 F.2d 1026, 202 USPQ 175 (CCPA 1979).) Because Alexander discloses metal-metal oxide composite powders covering a large number of species of metals, and fails to explicitly or inherently (*i.e.,* each and every time) teach the invention exactly as claimed, Alexander contains no teaching that anticipates any claim now pending.

II. Claims 39 and 41 are not obvious under 35 U.S.C. § 103(a) in view of U.S. Patent No. 4,944,985 to Alexander.

Claim 39 depends from independent claim 32, and claim 41 depends from independent claim 33. As discussed above in Section I, claims 32 and 33 require nanofillers

with a domain size less than 250 nanometers and less than 100 nanometers, respectively, the and nanofillers comprising ***copper***. Alexander fails to teach, in an anticipatory manner, the subject matter of these claims.

The obviousness rejection of claims 39 and 41 is predicated upon the assertion that (i) claims 32 and 33 are anticipated by Alexander, that (ii) Alexander teaches that his products may be used to manufacture inks, *etc.*, and that (iii) it is "known in the printing arts that inks, for example, are suitable in the formation of printed matter." Assuming *arguendo* that the latter two assertions are correct, the flaw with this argument is that the first assertion ("i") is not correct: Alexander does not anticipate any of claims 32 and 33, as is detailed above. Accordingly, a *prima facie* case of obviousness has not been established with respect to claims 39 and 41, as the argument in the Office Action is fundamentally flawed.

III. Claims 17-31 and 34-37 are not obvious under 35 U.S.C. § 103(a) in view of U.S. Patent No. 4,944,985 to Alexander as a primary reference and U.S. Patent No. 4,292,029 to Craig or U.S. Patent No. 5,718,047 to Nakayama as secondary references.

Claims 17-23, 34 and 35 require metallic fillers with domain size less 100 nanometers and ***aspect ratios greater than one***. Claims 24-31 and 36-37 require ceramic nanofillers with a domain size less than 100 nanometers, and ***aspect ratios greater than one.***

The Office Action recognizes that Alexander does not teach, in an anticipatory manner, the subject matter of these claims, but instead asserts that these claims are obvious in view of Alexander.

Correctly recognizing as a point of distinction between Alexander and independent claims 17 and 24, the lack of a teaching of aspect ratios greater than one, and thus recognizing that Alexander does not teach or suggest such features, the Office Action asserts that the secondary references, Craig and Nakayama, render claims 17 and 24 obvious. Not so.

MPEP § 2144.05(III), entitled Rebuttal Of *Prima Facie* Case Of Obviousness, states that a "*prima facie* case of obviousness may also be rebutted by showing that the art, in ***any*** material respect, teaches away from the claimed invention." (MPEP § 2144.05(III), second

paragraph, emphasis added, citing *In re Geisler*, 116 F.3d 1465, 1471, 43 USPQ2d 1362, 1366 (Fed.Cir. 1997).)

The teachings of Alexander focus on "spherical" particles. That is, particles that have an aspect ratio of one. For example, the passage cited in the Office Action showing the size range from 5 to 500 nanometers concerns particles that are "substantially spherical in shape or colloidal":

> material which may or may not be inert and which can be processed into ultrafine particles. When the particles are substantially spherical in shape or colloidal, the diameter of the particles are preferably less than 0.5 microns and in some instances the preferred range of size is 5 to 500 nanometers.

(Alexander, column 6, lines 36-40.) Furthermore, Alexander teaches that "inks ***require*** ... substantially spherical particles in order to achieve good performance":

> As Metallic Inks
>
> Metallic inks involving noble metals are, today, commonly used. These inks require discrete, constant sized and substantially spherical particles in order to achieve good performance. Silver composites containing silica can be prepared in which there is little or no aggrega-

(Alexander, column. 15, lines 65-67, emphasis added.) ***Because spherical particles have an aspect ratio of one***, there would be no need to consider the size of the particles. Indeed, based on the clear language of Alexander identified above, Alexander teaches away from the inventions captured by claims 17 and 24. Thus, to the extent that a *prima facie* case of obviousness has been established (which it has not, as is detailed below), that case is hereby rebutted.

* * * * *

The Office Action asserts that "it would have been obvious . . . to have provided the ultra-fine particles of Alexander et al. with aspect ratios greater than 1 ***motivated*** by the fact that Craig . . . teaches" various elements. (Office Action, page 3 last paragraph, emphasis added.) This motivation is conclusory, and does not comport with case law governing motivation to modify or combine the prior art to render a claim obvious. Simply because

another reference teaches a missing element of a claim with respect to a primary reference does not mean that the ordinary artisan would have been motivated to incorporate those elements into the primary reference. If such was the case, all inventions would automatically be obvious upon the mere identification of the location of various elements in the art. A *prima facie* case of obviousness has not been established for at least this reason.

* * * * *

It is well established that only result effective variables may be optimized. (*In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).) The Office Action cites nothing in the way of evidence, or presents no rationale at all, to substantiate the assertion that the aspect ratios taught by Alexander may obviously be varied (and thus optimized) to arrive at the invention as claimed. Indeed, the Office Action cites nothing along these lines regarding the recited sizes. This is yet another reason why a *prima facie* case of obviousness has not been established.

* * * * *

The Office Action contains a section entitled "Response to Arguments." Appellants hereby address the points raised in this section of the Office Action.

The Office Action asserts that Alexander does not teach away from the claimed particles having an aspect ratio of greater than one, asserting that Alexander merely teaches a preferred embodiment where the particles are spherical. Not so. As detailed above, Alexander explicitly states that the "inks ***require*** ... substantially spherical particles in order to achieve good performance." That is, Alexander is teaching that when substantially spherical particles are not used, good performance is not attained (else why would Alexander state that such particles are required for good performance). Alexander's teaching of spherical particles is more than just a mere preferred embodiment. This is, instead, an unequivocal statement of a "requirement" that substantially spherical particles be used to attain good results. Alexander thus clearly teaches away from the independent claims reciting an aspect ratio of greater than one.

The Office Action goes on to assert that even if Alexander taught away from these claims, the claims would still be obvious: the "Examiner respectfully submits that Alexander et al. does not teach away from the claimed particles . . . Nonetheless, the Examiner has combined Alexander et al. with the references [Craig and Nakayama] to illustrate the obviousness" of the claims. (Office Action , page 4, third paragraph.) This statement completely eviscerates the holding in *In re Geisler*, detailed above, that a *prima facie* case of obviousness may be rebutted by showing that the art, in ***any*** material respect, teaches away from the claimed invention. In this regard, it is irrelevant what other prior art references teach. When the primary reference teaches away from a claim, the claim is not obvious. Period.

The Office Action points to the *KSR*[1] decision as "foreclosing the argument that a specific teaching, suggestion or motivation is required to support a fining of obviousness." (Office Action, page 5, first paragraph.) Yet, the Examiner basis his current claim that independent claims 17 and 24 are obvious on the assertion that "it would have been obvious . . . to have provided the ultra-fine particles of Alexander et al. with aspect ratios greater than 1 ***motivated*** by the fact that Craig . . . teaches" various elements. (Office Action, page 3 last paragraph, emphasis added.) Thus, on the one hand, the Office Action asserts the teaching-suggestion-motivation test to form a case of obviousness, and then, on the other hand, uses *KSR* as holding that an Appellants' well reasoned arguments regarding a lack of motivation to modify the prior art may be unilaterally disregarded. This is impermissible. *KSR* does not prevent an Applicant from presenting arguments to counter a rejection sounding in the teaching-suggestion-motivation test.

[1] *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, ___, 82 USPQ2d 1385, 1397 (2007).

CONCLUSION

Appellants respectfully request that all rejections be reversed for the reasons set forth above.

Respectfully submitted,

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CLAIMS APPENDIX

Claims 1-16. Cancelled

17. A screen printable formulation comprising metallic fillers with domain size less than 100 nanometers and an aspect ratio greater than one.

18. The screen printable formulation of claim 17 wherein the fillers are nanowhiskers.

19. The screen printable formulation of claim 17 wherein the fillers are fibers.

20. The screen printable formulation of claim 17 wherein the fillers are plates.

21. The screen printable formulation of claim 17 wherein the screen printable formulation is an ink.

22. The screen printable formulation of claim 17 wherein the screen printable formulation is a paste.

23. The screen printable formulation of claim 17 wherein the fillers comprise an element selected from the group consisting of aluminum, barium, bismuth, cadmium, calcium, cerium, cesium, cobalt, copper, europium, gallium, indium, iron, lanthanum, lithium, magnesium, manganese, molybdenum, neodymium, nickel, niobium, potassium, praseodymium, scandium, sodium, strontium, tantalum, tin, titanium, tungsten, vanadium, ytterbium, yttrium, zinc, and zirconium.

24. A screen printable formulation comprising ceramic nanofillers with domain size less than 100 nanometers and an aspect ratio greater than one.

25. The screen printable formulation of claim 24 wherein the nanofillers are nanowhiskers.

26. The screen printable formulation of claim 24 wherein the nanofillers are fibers.

27. The screen printable formulation of claim 24 wherein the nanofillers are plates.

28. The screen printable formulation of claim 24 wherein the screen printable formulation is an ink.

29. The screen printable formulation of claim 24 wherein the screen printable formulation is a paste.

30. The screen printable formulation of claim 24 wherein the nanofillers comprise an element selected from the group consisting of aluminum, barium, bismuth, cadmium, calcium, cerium, cesium, cobalt, copper, europium, gallium, gold, indium, iron, lanthanum, lithium, magnesium, manganese, molybdenum, neodymium, nickel, niobium, palladium, platinum, potassium, praseodymium, scandium, silver, sodium, strontium, tantalum, tin, titanium, tungsten, vanadium, ytterbium, yttrium, zinc, and zirconium.

31. The screen printable formulation of claim 24 wherein the nanofillers comprises at least one element from the group consisting of aluminum, antimony, boron, carbon, germanium, indium, nickel, nitrogen, oxygen, phosphorus, selenium, silicon, sulfur, or tellurium.

32. A screen printable formulation comprising nanofillers with domain size less than 250 nanometers and the nanofillers comprise copper.

33. A screen printable formulation comprising nanofillers with domain size less than 100 nanometers and the nanofillers comprise copper.

34. A product manufactured using the screen printable formulation of claim 17.

35. A print manufactured using the screen printable formulation of claim 17.

36. A product manufactured using the screen printable formulation of claim 24.

37. A print manufactured using the screen printable formulation of claim 24.

38. A product manufactured using the screen printable formulation of claim 32.

39. A print manufactured using the screen printable formulation of claim 32.

40. A product manufactured using the screen printable formulation of claim 33.

41. A print manufactured using the screen printable formulation of claim 33.

EVIDENCE APPENDIX

No evidence is hereby submitted.

RELATED PROCEEDINGS APPENDIX

There are no related proceedings.